

# Lesson 6-1 (pp. 282–289)

## Rate of Change and Slope

<b>Lesson Objectives</b> <b>1</b> Find rates of change from tables and graphs <b>2</b> Find slope	<b>NAEP 2005 Strand:</b> Algebra <b>Topic:</b> Algebraic Representations <b>Local Standards:</b> _____
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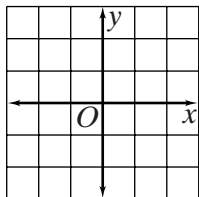
### Vocabulary and Key Concepts

#### Slope

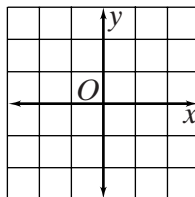
Slope is \_\_\_\_\_

$$\text{slope} = \frac{\text{vertical change}}{\text{horizontal change}} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}, \text{ where } x_2 - x_1 \neq 0$$

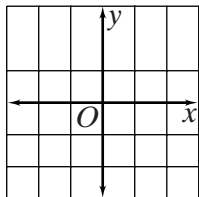
#### Slopes of Lines



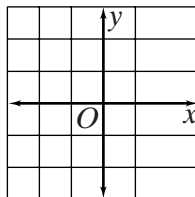
A line with \_\_\_\_\_ slope slants upward from left to right.



A line with \_\_\_\_\_ slope slants downward from left to right.



A line with a slope of 0 is \_\_\_\_\_.



A line with an undefined slope is \_\_\_\_\_.

$$\text{Rate of change} = \frac{\text{change in the } \boxed{\phantom{000}} \text{ variable}}{\text{change in the } \boxed{\phantom{000}} \text{ variable}}$$

## Examples

- 1 Finding Rate of Change Using a Table** For the data in the table, is the rate of change the same for each pair of consecutive mileage amounts?

Fee for Miles Driven	
Miles	Fee
100	\$30
150	\$42
200	\$54
250	\$66

Find the rate of change for each pair of consecutive mileage amounts.

$$\text{rate of change} = \frac{\text{change in cost}}{\text{change in number of miles}} \quad \text{Cost depends on the number of miles.}$$

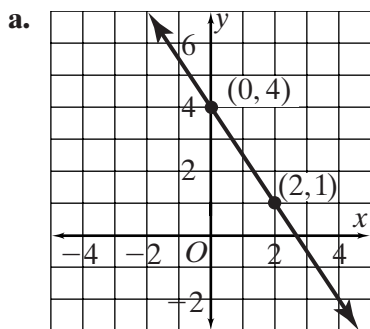
$$\frac{42 - 30}{150 - 100} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

$$\frac{\boxed{\phantom{000}} - 42}{200 - \boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

$$\frac{66 - \boxed{\phantom{000}}}{\boxed{\phantom{000}} - 200} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}} = \frac{\boxed{\phantom{000}}}{\boxed{\phantom{000}}}$$

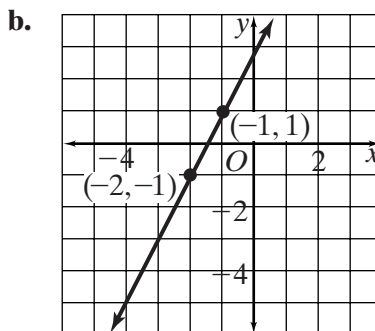
The rate of change for each pair of consecutive mileage amounts is \$  $\boxed{\phantom{000}}$  per  $\boxed{\phantom{000}}$  miles. The rate of change is the same for all the data.

- 2 Finding Slope Using a Graph** Find the slope of each line.



$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{\boxed{\phantom{00}} - 1}{0 - \boxed{\phantom{00}}} \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = -\frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \end{aligned}$$

The slope of the line is  $\boxed{\phantom{000}}$ .



$$\begin{aligned} \text{slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{-1 - \boxed{\phantom{00}}}{\boxed{\phantom{00}} - (-1)} \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} = \boxed{\phantom{000}} \end{aligned}$$

The slope of the line is  $\boxed{\phantom{000}}$ .

- 3 Finding Slope Using Points** Find the slope of the line through  $E(3, -2)$  and  $F(-2, -1)$ .

$$\text{slope} = \frac{\boxed{\phantom{00}} - y_1}{\boxed{\phantom{00}} - x_1}$$

$$= \frac{\boxed{\phantom{00}} - (-2)}{-2 - \boxed{\phantom{00}}}$$

Substitute  $(\boxed{\phantom{00}}, \boxed{\phantom{00}})$  for  $(x_2, y_2)$  and  $(\boxed{\phantom{00}}, \boxed{\phantom{00}})$  for  $(x_1, y_1)$ .

$$= \frac{1}{\boxed{\phantom{00}}} = -\frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}}$$

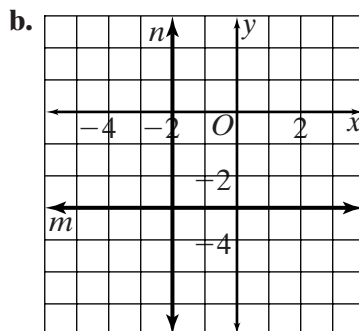
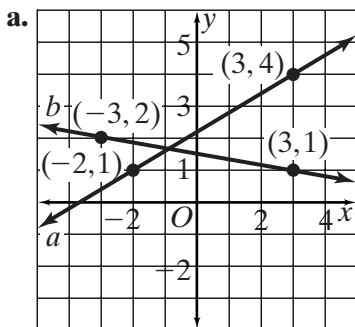
Simplify.

The slope of  $\overleftrightarrow{EF}$  is  $\boxed{\phantom{00}}$ .

### Check Understanding

1. Using the table in Example 1, find the rate of change using mileage amounts 100 and 200.

2. Find the slope of each line.



3. Find the slope of the line through each pair of points.

- a.  $C(2, 5)$  and  $D(4, 7)$

- b.  $P(-1, 4)$  and  $Q(3, -2)$

- c.  $M(a, b)$  and  $N(c, d)$